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Code No: 154AF

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech II Year II Semester Examinations, February - 2024

BASIC MECHANICAL ENGINEERING FOR CIVIL ENGINEERS

(Civil Engineering)

Time: 3 Hours

Max. Marks: 75

Note: i) Question paper consists of Part A, Part B.

ii) Part A is compulsory, which carries 25 marks. In Part A, answer all questions.

iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART – A

(25 Marks)

- 1.a) Specify the common types of follower motions. [2]
- b) Define composite material. How are composites classified? [3]
- c) What is module and pitch circle? [2]
- d) Draw the schematic diagram of a jib crane and list its applications. [3]
- e) List the various components in a thermal power plant. [2]
- f) Consider the heat transfer from an evacuated filament bulb. Show all the pertinent heat transfer processes associated with the bulb [3]
- g) List the main advantages of the casting process. [2]
- h) Narrate the spring back phenomenon in metals. [3]
- i) Name the types of hole making operations. [2]
- j) Give the classification of the material removal processes. [3]

PART – B

(50 Marks)

- 2.a) Define ferrous and non-ferrous materials with their properties and suitable applications.
- b) Describe the various heat treatment processes of the metal to change the mechanical properties. [5+5]

OR

- 3.a) Explain how torsional shear stress is developed in an eccentrically loaded riveted joint.
- b) A double-riveted, single-row butt joint is used to connect two plates of thickness 22 mm each. The diameter of the rivets is 30 mm each. The pitch between the rivets is 100 mm. The load applied on the plates is such that the tensile stress developed in the plates is 75 MPa. What are the shearing and bearing stresses in the rivets? What is the thickness of the cover plates? [4+6]

- 4.a) Compare the belt drive, chain drive and gear drive based on the criteria: (i) power transmission, (ii) centre distance and (iii) angular velocity ratio.
- b) What is initial tension in the belt? Explain the effect of centrifugal tension in the belt. [6+4]

OR

- 5.a) Explain with a neat sketch the 'sun and planet wheel'.
- b) What is the law for velocity of sliding between a gear pair?
- c) What is the effect of centre distance variation on speed ratio in gears? [4+3+3]

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6. Draw a simple sectional elevation of a 4-stroke single cylinder spark ignition engine indicating the various components. Also specify the function of each component. [10]

OR

7.a) What is one tonne of refrigeration? What is the basic formula for calculating the tonnage of refrigeration?

b) Discuss the Bell–Coleman cycle for air refrigeration with the help of schematic, T–s and p–v diagrams. [4+6]

8.a) Sketch the cross section of a sand mould which is ready for pouring and label the various important parts. Also state the functions of each part.

b) Washers of 10 mm inside diameter and 20 mm outside diameter are to be obtained from 1 mm thick sheet metal. Sketch the tools required and name them. [6+4]

OR

9.a) What are the kinds of joints that are normally employed for welding purposes? Give their sketches and applications.

b) Show the cross section of a gas cutting operation labeling important details. [6+4]

10.a) Describe the following operations performed in a centre lathe with suitable sketches: Turning, Facing and Knurling.

b) Draw the schematic diagram of milling process and name the parts. [6+4]

OR

11.a) Explain different types of drilling machines that are used in machine shops.

b) Write short note on structure of a grinding wheel. [5+5]

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